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Clarification of the differences between *Galaxiella nigrostriata* (Shipway, 1953) and *Galaxiella munda* McDowall, 1978 (Pisces: Galaxiidae) from Western Australia

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Abstract

Galaxiella nigrostriata and *G. munda* are sympataric species that are difficult to distinguish due to their similarity and to contradictions in previously published diagnoses. Additional more reliable characters are as follows: the dorsal fin of *G. nigrostriata* originates anterior to the 5th anal ray, whereas in *G. munda* the dorsal fin originates posterior to the 5th anal ray. Immature *G. nigrostriata* have a thin, irregular white stripe on the lower side of the body from the pectoral fin to the anal fin. This stripe is lacking in small *G. munda*. Mature *G. nigrostriata* are easily distinguished by the presence of two black lateral bands separated by an orange band. Additional meristic data are presented, and published errors are corrected.

Introduction

Galaxiella nigrostriata and *G. munda* are small (maximum standard length 45 mm) endemic sympatric galaxiids in the southwest coastal drainage of Western Australia. A third species, *Galaxiella pusilla* (Mack, 1936) occurs in southeastern Australia. The difficulty in separating *G. nigrostriata* and *G. munda* has been compounded by errors in published keys, descriptions, and photographs. The purposes of this paper are to provide relatively easy-to-use characters by which these species can be distinguished and to correct the published errors.

G. nigrostriata was considered by Shipway (1953) to be a subspecies of *G. pusilla* which was at that time placed in *Galaxias* or *Brachygalaxias*. Scott (1971) recommended full specific rank and McDowall (1978) erected the new genus *Galaxiella* and described a third Australian species, *G. munda*. The latest comprehensive review of Australian galaxiids is by McDowall and Frankenberg (1981).

Characters used by McDowall (1978) and McDowall and Frankenberg (1981) to separate *G. nigrostriata* from *G. munda* overlap (for example, the ranges of pelvic and pectoral fin rays, see Table 1). Consequently it may be difficult to separate the two species using them.

Methods

Both species were collected together in November and December 1988 with a 3 m seine of 1.6 mm mesh from an unnamed intermittent tributary of the Gardner River 11 km S. of Northcliffe, W.A. off Chesapeake Rd. All specimens were fixed in 10% buffered

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formalin, stored in 75% ethanol, and measured to the nearest mm of standard length (SL). Additional specimens of *G. nigrostriata* collected in September 1988 from a pool receiving overflow from the above mentioned stream during flooding were dissected to ascertain the presence of sexual dimorphism. A dissection microscope was used to make the diagnostic counts of segmented rays used by McDowall (1978) and McDowall and Frankenberg (1981).

Diagnosis

Coloration

Adult *G. nigrostriata* of both sexes are easy to distinguish because of their colour pattern. They possess two black longitudinal bands along the sides separated by an orange band (Shipway 1953) (Figure 1). This pattern develops at about 28 mm SL, although some larger individuals may lack it. Immature fish are uniform olivaceous with a thin, irregular white or silvery stripe along the lower sides extending from under the pectoral fin to the anal fin (Figure 1). This stripe, not present in adults, is still visible in preserved specimens for 12 years. From an examination of a series of freshly caught

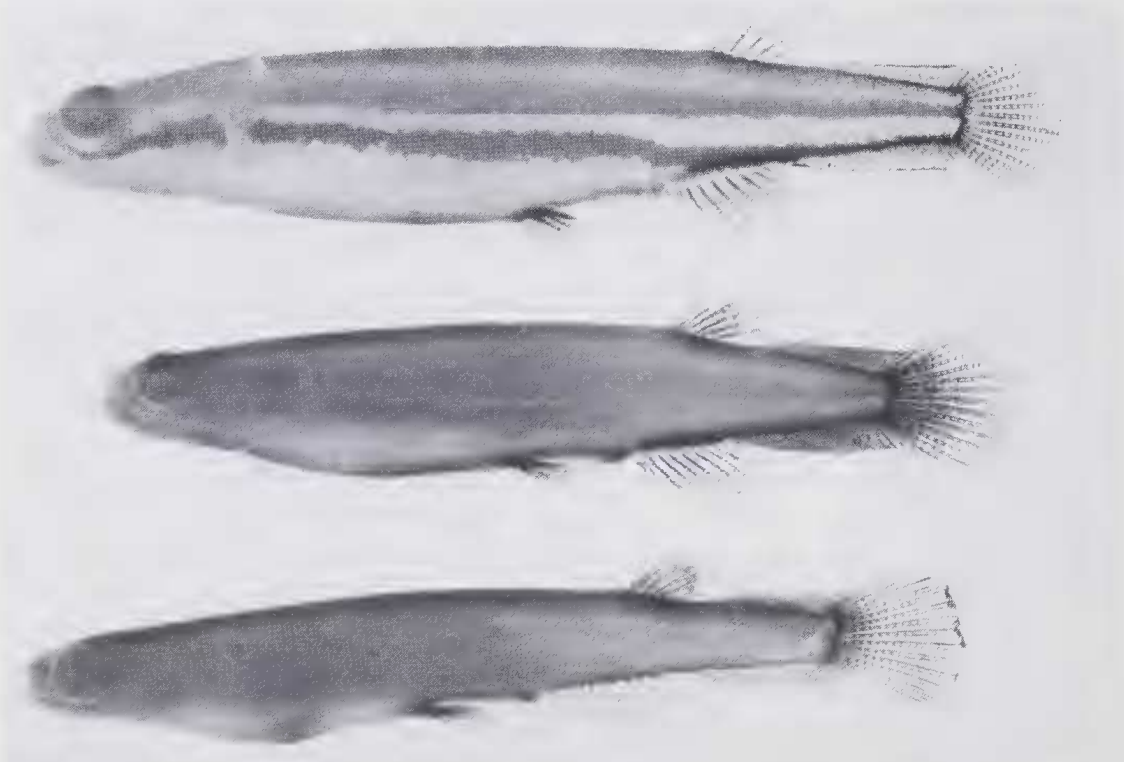

Figure 1. Adult female *Galaxiella nigrostriata* (28 mm SL) showing stripped pattern (Top). Immature *G. nigrostriata* (24 mm SL) (Centre). Immature *G. munda* (24 mm SL) (Bottom). Note position of dorsal origin relative to anal fin and presence of thin irregular white stripe in *G. nigrostriata*.

specimens, it appears as if this silvery stripe expands to become the orange band of adults. This may be a seasonal phenomenon.

Adult *G. munda* are olivaceous with a silvery, lateral, longitudinal stripe and, in life, a broad orange band. A colour photograph of *G. munda* is given in Merrick and Schmida (1984). The thin silvery stripe is more noticeable posteriorly. The belly is bright silvery white. Juveniles are uniform olivaceous and small specimens lack the thin silvery stripe (McDowall 1978).

Morphometrics

McDowall's (1978) morphometric data revealed that *G. nigrostriata* is slightly deeper bodied than the slender *G. munda*. This is noticeable when fish of the same length are compared (Figure 1).

Counts on 30 *G. nigrostriata* (17-26 mm SL) and 21 *G. munda* (21-30 mm SL) are shown in Table 1 along with McDowall's (1978) data for the same parameters. Each character shows some degree of overlap and no single character is completely diagnostic.

Most *G. nigrostriata* have 9 segmented anal rays and most *G. munda* have 10-12 (Table 1). The presence of 1-3 short, slender rays often obscured by adipose tissue near the fin orgin makes this character difficult to use.

Table 1 Number of individuals in each category of meristic variation in *Galaxiella nigrostriata* (N=30) and *G. munda* (N=21). Counts are of segmented rays only.

Character		*G. nigrostriata*		*G. munda*	
		McDowall 1978	This Study	McDowall 1978	This Study
Anal Fin					
Rays	8	2	4		
	9	11	23	1	
	10	3	3	12	1
	11	3		19	10
	12			5	10
Pelvic Fin					
Rays	5	19	28	2	10
	6		2	33	11
	7			2	
Pectoral Fin					
Rays	9			1	1
	10			15	9
	11	3		19	10
	12	14	16	3	1
	13	4	14		
	14	1			

G. nigrostriata usually has 5 pelvic rays, as do almost half of our *G. munda* specimens. We had difficulty in determining whether the thin, innermost ray is united at

its base to the adjacent ray. The difference between our counts and McDowall's (1978) probably refleet this uncertainty.

G. nigrostriata usually has 12-13 pectoral rays vs. 10-11 for *G. munda,* but care must be take to count thc lowermost small ray.

In addition to the lateral stripe discussed above, an additional character that separatcs these species nearly 100% of the time involves the dorsal fin origin. In *G. nigrostriata* the dorsal fin originates over the third or fourth anal ray (see Shipway 1953), and in *G. munda* it begins above the seventh or eighth anal ray (Figure 1); i.e. if the dorsal fin origin is behind the fifth anal ray, the fish belongs to *G. munda* (Table 2). This is not refleeted in the drawings in McDowall and Frankenberg (1981: 564, 567).

Table 2. Summary of the major differenccs bctwcen *Galaxiella nigrostriata* and *G. munda.*

G. nigrostriata	*G. munda*
Dorsal fin origin anterior to 5th anal fin ray.	Dorsal fin origin posterior to 5th anal fin ray.
Thin irregular white stripe on lower side of body from pectoral fin to anal fin of small juveniles.	No such stripe in small juveniles.
Pectoral fin rays 12-13.	Pectoral fin rays 10-11.
Anal fin rays usually 9.	Anal fin rays usually 10-12.
Gill rakers long and slender.	Gill rakers of moderate length.
Body shape stocky.	Body shape slender.
Adults with two black bands on sides separated by orange band.	Adults without two hlack bands on sides, but with thin, irregular, white stripe.

Corrections of Published Errors

G. nigrostriata has long slender gill rakers and *G. munda* has shorter gill rakers (e.g. Figurc 44 and description p. 562 in McDowall and Frankenberg, 1981). Various confusing statements have bee made in this text (p. 552, 562, 568) and in McDowall (1979: 118-9) about gill raker size. Similarly, *G. nigrostriata* is incorrectly described as having morc anal fin rays than *G. munda* in McDowall and Frankenberg, 1981: 562), but this error does not appear in MeDowall (1978 Tablc 1) and McDowall and Frankenberg (1981 Table 16). Allen (1982 Plate 5 Figure 2) incorrectly labelled a colour photograph of a mature *G. nigrostriata* as *G. munda.* Thus his Figures 1 and 2 of Plate 5 are a juvenile and an adult *G. nigrostriata* respectively, and *G. munda* is not illustrated.

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